National Transportation Safety Board
Aviation Accident Final Report

Location:	Sauk Rapids, MN	**Accident Number:**	CEN14FA306
Date & Time:	06/20/2014, 2029 CDT	**Registration:**	N135BB
Aircraft:	BRUMWELL RV-6	**Aircraft Damage:**	Destroyed
Defining Event:	Inflight upset	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

About 5 minutes after the experimental amateur-built RV-6 airplane departed from a local airport, an air traffic controller notified the pilot that an Airbus was 30 miles southwest of the airport and inbound. About 7 minutes later, the pilot reported that he had the Airbus in sight and then stated that he was going to take a picture of it. No further communications were received from the pilot. A witness reported observing the RV-6 “rocking back and forth” before the “nose went down” and then seeing two objects come off the airplane when it entered a descent. Another witness reported hearing engine noise before observing the airplane enter a steep nose-down descent. The airplane impacted a house and was destroyed by a postimpact fire.

The two objects that the witness observed coming off the RV-6, which were a headset and PVC material, were later located near the accident site and did not exhibit thermal damage or soot. The exit of the two objects from the airplane’s interior indicates that the canopy likely opened in flight, which led to the loss of pitch control. Fire damage precluded examination of the airplane’s canopy and systems; therefore, the reason for the canopy opening in flight could not be determined. There was no radar or recorded position and time data for either airplane; therefore, the effects, if any, of wake turbulence from the Airbus on the RV-6 could not be determined.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s loss of pitch control due to the in-flight opening of the canopy during cruise flight for reasons that could not be determined because fire damage precluded examination of the airplane’s canopy and systems.

Findings

Aircraft	Pitch control - Attain/maintain not possible (Cause)
	Flight compartment windows - Unintentional use/operation (Cause)
Not determined	Not determined - Unknown/Not determined (Cause)

Factual Information

HISTORY OF FLIGHT

On June 20, 2014, about 2029 central daylight time, an experimental amateur-built Brumwell RV-6, N135BB, impacted a house after a departure from cruise flight near Sauk Rapids, Minnesota, and about 6 miles northwest of the St Cloud Regional Airport (STC), St Cloud, Minnesota. The pilot and passenger were fatally injured. The airplane was destroyed by post-crash fire. The airplane was registered to and operated by the pilot under 14 CFR Part 91 as a personal flight and was not operating on a flight plan. Visual meteorological conditions prevailed at the time of the accident. The local flight originated from STC about 2010.

According to a transcript of STC Air Traffic Control Tower (ATC) communications, the pilot contacted STC ATC about 2011 and transmitted an initial departure heading of west/southwest.

About 2012, ATC cleared the airplane for takeoff from runway 13 and a turn to the west/southwest.

About 2016, the pilot transmitted that it would maneuver over the western part of town, then fly up the river, and contact ATC when inbound. The pilot transmitted the flight was an aerial tour of the city for the passenger aboard.

About 2017, ATC transmitted that an Airbus 319 [Allegiant Flight 108 (AAY108)] was 30 miles southwest of the airport and was inbound. The pilot transmitted, "I'll look for allegiant..."

About 2023, AAY108 transmitted that it was on a right base for runway 13. ATC then cleared AAY108 to land on runway 13. The pilot transmitted that they were over the river, by the hospital at 2,000 feet. The pilot then transmitted, "ah where's the airbus right now." AAY108 transmitted that it was 11 [miles] southwest of the airport.

About 2024, ATC and the pilot transmitted that they had AAY108 in sight. The pilot then transmitted, "and allegiant one three five bravo bravo i'm an r v six about your 12 o'clock position right over the river at two thousand feet." AAY108 transmitted that it had the airplane on its traffic collision avoidance system (TCAS) and was currently descending through 3,300 feet. The pilot transmitted, "yeah we'll keep comms with you plenty of room to maneuver there."

About 2025, the pilot transmitted, "I got a camera out we're gonna take a picture of ya." AAY108 transmitted, "we have you in sight as well."

There were no further transmissions from the airplane.

A witness near the accident site stated seeing a jet flying east and a small airplane flying north. The small airplane started "wobbling and shaking" and then started "going down." The small airplane was offset from the jet about 45 degrees from the tail of the jet. The witness stated that the small airplane may have been at a higher altitude than the jet. The small airplane's wings were "rocking back and forth" before the "nose went down." The witness stated seeing a dark and a light colored object come from the small airplane.

Another witness stated that he was sitting and facing east in his house's driveway. He looked south when he heard engine noise from the accident airplane. He said the airplane was in a "nose-dive." He said that the airplane was heading north. The airplane had about a 70 degree

nose down attitude while in the descent. He said there was no fire from the airplane. The airplane was not rotating while it was descending. He said the winds were from the south and that there was "not a lot of wind."

OTHER DAMAGE

The home that was struck by the airplane sustained impact and fire damage.

PERSONNEL INFORMATION

The pilot, age 60, was employed as captain on Boeing 737 airplanes at an air carrier. He held an airline transport pilot certificate with airplane multiengine land, airplane single-engine land, airplane single- engine sea ratings. He held Boeing 727 and Boeing 737 type ratings. He held a flight instructor certificate with airplane single-engine and instrument airplane ratings. He held a flight engineer certificate with a turbojet powered rating.

A pilot logbook recovered from the wreckage had a beginning entry dated April 2013 with a tachometer time entry of 1,324.7 hours and the last entry was dated June 2014 with a tachometer time entry of 1,383.2 hours. All the pilot logbook were entries for the accident airplane.

The pilot's flight experience included 24,465 total hours, of which 478 hours were in the last six months as of his last airman medical examination dated January 23, 2014. The pilot was issued a first class airman medical certificate with the following limitation: must wear corrective lenses.

AIRCRAFT INFORMATION

The airplane was a 1992 Brumwell RV-6, serial number 20598, experimental amateur-built airplane that was powered by a Lycoming O-360-A1A, serial number L-33015-36A, engine. The airplane was built by the previous owner/builder. The airplane was equipped with an upward (tip-up) opening canopy.

On December 19, 2012, the pilot purchased the airplane from the aircraft builder. On March 5, 2013, the airplane's registration to the pilot was accepted by the Federal Aviation Administration.

On January 6, 2013, at a total time in service and a tachometer time of 1,305.9 hours, the last aircraft logbook entry made by the previous owner/builder was for a pre-sale checkout of the airplane, which "checked ok."

The pilot logbook that was recovered from the wreckage had an entry dated August 24, 2013, for a flight in the accident airplane from JKJ [Moorhead Municipal Airport, Moorhead, Minnesota] to STC. The remarks section of this entry contained "canopy opened descending @ 120 kts STC" at a tachometer time of 1,359.6 hours. A review of the airframe logbook did not reveal a corresponding entry relating to the August 24, 2013, pilot logbook entry.

On April 14, 2014, at a total time in service and a tachometer time of 1,373 hours, an aircraft and engine logbook entries indicated that a condition inspection was completed and that the airplane and engine were found to be in a condition for safe operation. The entries were signed by an airframe and power plant mechanic. There were no additional aircraft logbook entries dated after April 14, 2014.

FLIGHT RECORDERS

There was no nonvolatile memory that could provide airplane position and time information due to the airplane's type of avionics installation and damage from the accident. There was no radar data available for the airplane. The flight data recorder from AAY108 was downloaded by the National Transportation Safety Board Vehicle Recorders Laboratory. The download included parameters of airplane position, altitude, speed, and configuration.

A plot of AAY108's flight track was produced by a National Transportation Safety Board Senior Air Traffic Investigator and is included in the docket of the report.

WRECKAGE AND IMPACT INFORMATION

The airplane was consumed by post-crash fire and by the fire of the home that the airplane impacted. The damage precluded functional testing and examination of the airplane systems. The canopy and its latching mechanisms were consumed by fire and could not be examined.

A headset case that contained an aviation head set and white PVC material were found at a neighboring house near the accident site. The pilot's name was on materials within the headset case. The head set and PVC material did not exhibit thermal damage or soot. PVC material has been used by builders of homebuilt airplanes for wheel chocks or control locks.

MEDICAL INFORMATION

An autopsy of the pilot was conducted by the Midwest Medical Examiner's Office, Ramsey, Minnesota, on June 21, 2014. The autopsy report stated the cause of death as multiple blunt force injuries due to plane crash.

The FAA's Final Forensic Toxicology Fatal Accident Report of the pilot stated that testing for carbon monoxide and cyanide were not performed, no ethanol was detected in the muscle and the liver, and no listed drugs were detected the in liver.

TESTS AND RESEARCH

The effects of wake turbulence, if any, could not be determined without relative position and time information from radar/recorded data for both airplanes.

The Lancair Legacy Canopy Safety Issue (Thorn 2014) discusses accidents resulting from flight with the upward opening canopies that become unlatched/open in flight for Lancair and not RV airplanes, which also have upward opening canopies. The paper states in part:

"There are several potential root causes of the Legacy's open canopy flight hazard. One is the canopy is large and, if not latched down in flight, it will open to varying degrees and alter the air flow over the tail/stabilizers and under some situations create significant pitch attitude stability and control issues.

Another potential root cause may be the pilot's loss of reliable airplane pitch attitude reference where the canopy's structural frame serves as a key attitude reference line and as the open canopy moves it corrupts the pilot's normal visual pitch attitude reference cues.

There may also be a tendency for pilots flying with the shock and chaos of an open canopy, with severe cockpit wind, noise, and debris flying about, to induce pitch attitude oscillations by their control inputs."

History of Flight

Enroute-cruise	Inflight upset (Defining event) Loss of control in flight
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Airline Transport	**Age:**	60
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	**Seat Occupied:**	
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine; Instrument Airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With Waivers/Limitations	**Last FAA Medical Exam:**	01/23/2014
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 24465 hours (Total, all aircraft), 59 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	BRUMWELL	**Registration:**	N135BB
Model/Series:	RV-6	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental	**Serial Number:**	20598
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	04/14/2014, Condition	**Certified Max Gross Wt.:**	
Time Since Last Inspection:	10 Hours	**Engines:**	1 Reciprocating
Airframe Total Time:	1383 Hours at time of accident	**Engine Manufacturer:**	Lycoming
ELT:		**Engine Model/Series:**	O-360-A1A
Registered Owner:	Pilot	**Rated Power:**	180 hp
Operator:	Pilot	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	STC, 1031 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	2053 CDT	**Direction from Accident Site:**	131°
Lowest Cloud Condition:	Clear	**Visibility**	10 Miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	130°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.83 inches Hg	**Temperature/Dew Point:**	26°C / 16°C
Precipitation and Obscuration:			
Departure Point:	St Cloud, MN (STC)	**Type of Flight Plan Filed:**	None
Destination:	St Cloud, MN (STC)	**Type of Clearance:**	None
Departure Time:	2010 CDT	**Type of Airspace:**	

Airport Information

Airport:	St Cloud Regional Airport (STC)	**Runway Surface Type:**	N/A
Airport Elevation:	1031 ft	**Runway Surface Condition:**	
Runway Used:	N/A	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	45.609444, 94.166111

Administrative Information

Investigator In Charge (IIC):	Mitchell F Gallo	**Report Date:**	03/02/2015
Additional Participating Persons:	David Nelson; Federal Aviation Administration; MSP FSDO; Minneapolis, MN		
Publish Date:	03/02/2015		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=89510		